AMENDMENTS TO THE CLAIMS

Please amend the claims as follows.

1-17 (Canceled).

18. (Currently Amended) A method of operating a data processing system, the method comprising the steps of:

providing an expression profile of a network, said network represented by triplets having a network structure, parameters, and a degree of fitness;

generating network structures allowing said expression profile, said generated network structures being stored in a topology pool;

selecting network structures from said topology pool, adapting said parameters to said selected network structures, and computing said degrees of fitness;

storing said selected network structures represented by triplets resulting from steps above in a triplet pool; and

screening candidate networks from said triplet pool, said screened candidate networks being stored in a candidate triplet pool.

19. (Presently presented) The method mentioned in claim 18, wherein the steps of selecting network structures and adapting said parameters comprise the steps of:

selecting N network structures from said topology pool; and

adapting M parameter sets to each of said selected N network structures, said M parameter sets having the highest degree of fitness with said expression profile.

20. (Previously presented) The method mentioned in claim 19, wherein the step of adapting M parameters further comprises the step of:

estimating parameters using a process from the group consisting of a genetic algorithm and simulated annealing.

21. (Currently amended) The method mentioned in a claim 19, wherein after the step of storing network structures, the method further comprises the steps of:

reorganizing network structures of N networks in the triplet pool using a process from the group consisting of a genetic algorithm and simulated annealing;

adapting parameter sets to each of said N reorganized network structures; and

storing N × M networks in said triplet pool, each of said N × M networks having one of said M parameter sets having high degrees of fitness.

22. (Previously presented) The method mentioned in claim 21, wherein after the step of storing N × M networks, the method further comprises the steps of:

selecting P triplets having degrees of fitness at or above a predetermined threshold value from among triplets in said triplet pool, left only said P triplets in the triplet pool as a result.

23. (Previously presented) The method mentioned in claim 22, wherein after the step of selecting a P triplet, the method further comprises the steps of:

searching the vicinity of said selected P triplet; and

replacing said searched P triplets when finding a triplet of higher degree of fitness.

24. (Previously presented) The method mentioned in claim 18, wherein the step of screening candidate network comprises the steps of:

producing a mutant triplet for each triplet from said triplet pool, a mutant pool storing said mutant triplet;

evaluating a degree of fitness with a mutant profile for said mutant pool; and

integrating said degrees of fitness for said mutant pool, if a candidate group having a degree of fitness above a certain value being chosen and stored in said candidate triplet pool.

25. (Previously presented) The method mentioned in claim 24, wherein said mutant triplet is produced by eliminating a gene and removing all bonds from said gene.

26. (Previously presented) The method mentioned in claim 18, wherein the structure of said generated network structure is partially known.

27. (Previously presented) A computer program embodied on a computer readable medium comprising:

code means adapted to perform all the steps of claim 18 when said program is run on a data-processing system.

28. (Currently amended) A network estimation apparatus comprising:

means for providing an expression profile of a network, said network represented by triplets having a network structure, parameters, and a degree of fitness;

means for generating network structures allowing said expression profile, said generated network structures being stored in a topology pool;

means for selecting network structures from said topology pool, adapting said parameters to said selected network structures, and computing said degrees of fitness;

means for storing said network structures represented by triplets resulting from means above in a triplet pool; and

means for screening candidate networks from said triplet pool, said screened candidate networks being stored in a candidate triplet pool.

29. (Currently amended) A method of operating a data processing system which estimates candidate networks that are descriptive of relationships between interrelated elements as a network and that, when data generated by said elements from said network is given, are capable of reproducing data based on said data given:

said network being represented by a triplet comprising:

a network structure,

a parameter set, and

a degree of fitness between said data given and data reproduced from the network structure and the parameter set,

said method comprising the steps of:

generating a plurality of candidate networks by producing network structures based on partially known network structures, which may allow for reproduction of said data given,

producing corresponding parameter sets and degrees of fitness,

optimizing said candidate networks utilizing the degrees of fitness, and

storing the optimized candidate networks in a first memory means; and

narrowing down appropriate candidate networks from said candidate networks stored in the first memory means, using data different front said given data and that can be generated from network structures which are mutants or crossovers, and storing the networks in a second memory means.

30. (Currently amended) The method mentioned in claim 29, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises steps of:

selecting N network structures from the produced network structures,

~~producing N network structures from said selected N network structures,~~

adapting M parameter sets to each of the ~~2~~ selected N network structures and utilizing the degrees of fitness to generate ~~the~~ 2N × M networks, and

selecting P networks of high degree of fitness from the generated 2N × M networks.

31. (Presently presented) The method mentioned in claim 30, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks further comprises steps of:

searching the vicinity of said selected P networks, and

replacing the network when finding a network of higher degree of fitness.

32. (Presently presented) The method mentioned in claim 30, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises a step of estimating parameters using a genetic algorithm, simulated annealing, and/or an optimization technique such as the hill-climbing method.

33. (Presently presented) The method mentioned in claim 29, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises a step of estimating parameters using a genetic algorithm, simulated annealing, and/or an optimization technique such as the hill-climbing method.

34. (Presently presented) A network estimation apparatus, which estimates candidate networks that are descriptive of relationships between inter related elements as a network and that, when data generated from said network is given, are capable of reproducing said data based on said data given; said network estimation apparatus comprising:

first memory means for storing networks represented by a triplet comprising a network structure, a parameter set, and a degree of fitness between said data given and data reproduced. from the network structure and the parameter set;

second memory means for storing networks as final candidates;

means for generating a plurality of candidate net works by producing a network structure based on partially known network structures, which may allow for reproduction of said data given, producing corresponding parameter sets and degrees of fitness, optimizing said networks utilizing the degrees of fitness, and storing in said first memory means the optimized candidate networks; and

means for narrowing down and storing in said second memory means an appropriate candidate network from net works stored in said first memory means using data different from said given data and that can be generated from network structures which are mutants or crossovers.

35. (Currently amended) A computer program embodied on a computer readable medium, the computer program being adapted to perform steps of:

generating a plurality of candidate networks by producing network structures based on partially known network structures, which may allow for reproduction of said data given,

producing corresponding parameter sets and degrees of fitness,

optimizing said candidate networks utilizing the degrees of fitness, and

storing the optimized candidate networks in a first memory means; and

narrowing down appropriate candidate networks from said candidate networks stored in the first memory means, using data different front said given data and that can be generated from network structures which are mutants or crossovers, and storing the networks in a second memory means.

36. (Currently amended) The computer program mentioned in claim 35, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises steps of:

selecting N network structures from the produced network structures,

~~producing N network structures from said selected N network structures,~~

adapting M parameter sets to each of the ~~2~~ selected N network structures and utilizing the degrees of fitness to generate ~~the~~ 2N × M networks, and

selecting P networks of high degree of fitness from the generated 2N × M networks.

37. (Presently presented) The computer program mentioned in claim 36, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks further comprises steps of:

searching the vicinity of said selected P networks, and

replacing the network when finding a network of higher degree of fitness.

38. (Presently presented) The computer program mentioned in claim 36, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises a step of estimating parameters using a genetic algorithm, simulated annealing, and/or an optimization technique such as the hill-climbing method.

39. (Presently presented) The computer program mentioned in claim 35, wherein the optimization using the degree of fitness in said step of generating said plurality of candidate networks comprises a step of estimating parameters using a genetic algorithm, simulated annealing, and/or an optimization technique such as the hill-climbing method.